

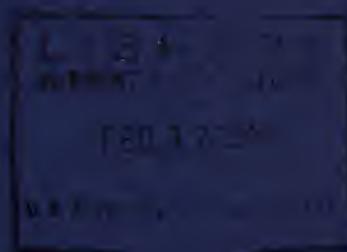
Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

196
31.Fsm

FEDERAL-STATE
COOPERATIVE SNOW SURVEYS and
IRRIGATION WATER FORECASTS

for
MISSOURI-ARKANSAS DRAINAGE BASIN
February 1, 1949



b7
Division of Irrigation, Soil Conservation Service
United States Department of Agriculture
and
Colorado Agricultural Experiment Station

Information in this report was obtained by the author from surveys in cooperation with the U. S. Forest Service,
Soil Conservation Service, State Engineers of Colorado, Wyoming and New Mexico and other Federal State and local hydrologists.



WATER SUPPLY OUTLOOK

MISSOURI-ARKANSAS DRAINAGE BASINS

February 1, 1949

Snow accumulation to February 1 was above normal throughout the mountain areas of the Missouri and Arkansas Rivers and their tributaries. The snow cover is relatively heavier in southern Wyoming and northern Colorado with somewhat less on the Bighorn, Upper Missouri and in northern Montana. Snow covers the valleys but in some districts drifting has been excessive. Reservoir storage in most areas is slightly under a year ago. Soil moisture is expected to be fairly good by spring even though many areas were dry before recent snows.

MISSOURI RIVER AND TRIBUTARIES IN MONTANA

From a limited number of snow surveys on the Upper Missouri and Yellowstone Rivers, the snow-water contents are about 40 percent above normal. Snow cover on the headwaters of the Madison and Gallatin Rivers is 50 to 60 percent above February 1, 1948. On the Jefferson River the snow cover is similar to a year ago but on the Missouri River tributaries between Helena and Great Falls it is 80 percent of last year. Snow conditions on the Marias River are much improved over a year ago. Storage in most Montana reservoirs at this time is very close to a year ago. In Fort Peck Reservoir the amount of water stored is now 12,700,000 acre-feet as compared to 13,130,000 on February 1, 1948. Precipitation during January has been near average. At the present time ice-flows in the Missouri and Yellowstone Rivers are presenting a definite flood hazard in case of a sudden thaw.

BIGHORN RIVER BASIN

As shown by February 1 snow surveys the snow accumulation is not as heavy as on adjacent watersheds. An exception to this trend is the headwaters of the Popo Agie where the snow-water content is 162 percent of normal. The snow cover is relatively higher at 9500 to 10,000 feet with near average conditions at lower elevations. Range and irrigated areas are snow-covered throughout the valley above and below the Wind River Canyon. Storage in Buffalo Bill Reservoir is now 230,000 as compared to 344,000 on February 1, 1948. In Bull Lake and Pilot Butte Reservoirs there is now stored 63,000 acre-feet; a year ago it was 111,000. Soil moisture conditions are reported as good throughout the Basin.

CHEYENNE RIVER

Snow cover in the Black Hills is about twice normal and is considered adequate to fill Belle Fourche Reservoir, which now has 116,000 acre-feet in storage.

DISCUSSIONS ON THE SITUATION

IN THE FIELD

ARMED GUERRILLA
MOVEMENTS
ARE SPREADING
TO THE
COUNTRYSIDE
AND ARE
ATTACKING
THE STATE
ARMED
FORCES
AND POLICE
IN VARIOUS
PARTS OF THE
COUNTRY.

ARMED
GUERRILLA
MOVEMENTS
ARE SPREADING
TO THE
COUNTRYSIDE
AND ARE
ATTACKING
THE STATE
ARMED
FORCES
AND POLICE
IN VARIOUS
PARTS OF THE
COUNTRY.

PROBLEMS
OF THE
ARMED
FORCES

ARMED
GUERRILLA
MOVEMENTS
ARE SPREADING
TO THE
COUNTRYSIDE
AND ARE
ATTACKING
THE STATE
ARMED
FORCES
AND POLICE
IN VARIOUS
PARTS OF THE
COUNTRY.

ARMED
GUERRILLA
MOVEMENTS
ARE SPREADING
TO THE
COUNTRYSIDE
AND ARE
ATTACKING
THE STATE
ARMED
FORCES
AND POLICE
IN VARIOUS
PARTS OF THE
COUNTRY.

ARMED
GUERRILLA
MOVEMENTS
ARE SPREADING
TO THE
COUNTRYSIDE
AND ARE
ATTACKING
THE STATE
ARMED
FORCES
AND POLICE
IN VARIOUS
PARTS OF THE
COUNTRY.

ARMED
GUERRILLA
MOVEMENTS
ARE SPREADING
TO THE
COUNTRYSIDE
AND ARE
ATTACKING
THE STATE
ARMED
FORCES
AND POLICE
IN VARIOUS
PARTS OF THE
COUNTRY.

ARMED
GUERRILLA
MOVEMENTS
ARE SPREADING
TO THE
COUNTRYSIDE
AND ARE
ATTACKING
THE STATE
ARMED
FORCES
AND POLICE
IN VARIOUS
PARTS OF THE
COUNTRY.

ARMED
GUERRILLA
MOVEMENTS
ARE SPREADING
TO THE
COUNTRYSIDE
AND ARE
ATTACKING
THE STATE
ARMED
FORCES
AND POLICE
IN VARIOUS
PARTS OF THE
COUNTRY.

NORTH PLATTE RIVER

On the headwaters of the Laramie, North Platte and Sweetwater Rivers the snow accumulation to February 1 was very high. The snow-water contents are now close to the April 1 average for the past record and 50 to 80 percent above normal. Summer runoff in these streams should be at least average and if the present rate of snow accumulation continues the runoff will be excessive. Snow in the North Park area is estimated as the heaviest for the past 20 years. Storage in the four major reservoirs on the North Platte is now 1,119,000 acre-feet as compared to 1,339,000 a year ago. The normal carryover for these reservoirs for the past ten years is about 400,000 acre-feet. In the Wheatland Reservoir system, there is now 30,000 acre-feet in storage, about one-half of that stored on February 1, 1948. In Kingsley and Sutherland Reservoirs in Nebraska, the storage now totals 1,587,000 acre-feet, practically the same as last year. Soil moisture throughout the valley area from southern Wyoming to eastern Nebraska is reported as good. Streamflow is below normal due to extremely low temperatures in January.

SOUTH PLATTE RIVER

The water supply outlook for the South Platte and its tributaries is very favorable at this time. However, about one-half of the snow cover accumulates after February 1 on the average and any estimate of runoff should be considered as preliminary and subject to the amount of snow to come at a later date. With the exception of Boulder Creek the snow-water contents were much above normal. Boulder Creek snow courses show 9 percent above normal and 80 percent of last year. Other South Platte tributaries range from 149 percent of normal on Clear Creek to 229 percent of normal on the St. Vrain River. Reservoir storage for irrigation is generally slightly under last year and about 1/4 less in the Fort Morgan and Sterling districts. Recent precipitation has ranged from well over normal above Denver to normal throughout the rest of the valley. The soil is dry and in many areas the snow has drifted to such an extent as to be of little value to soil moisture. Streamflow is about average.

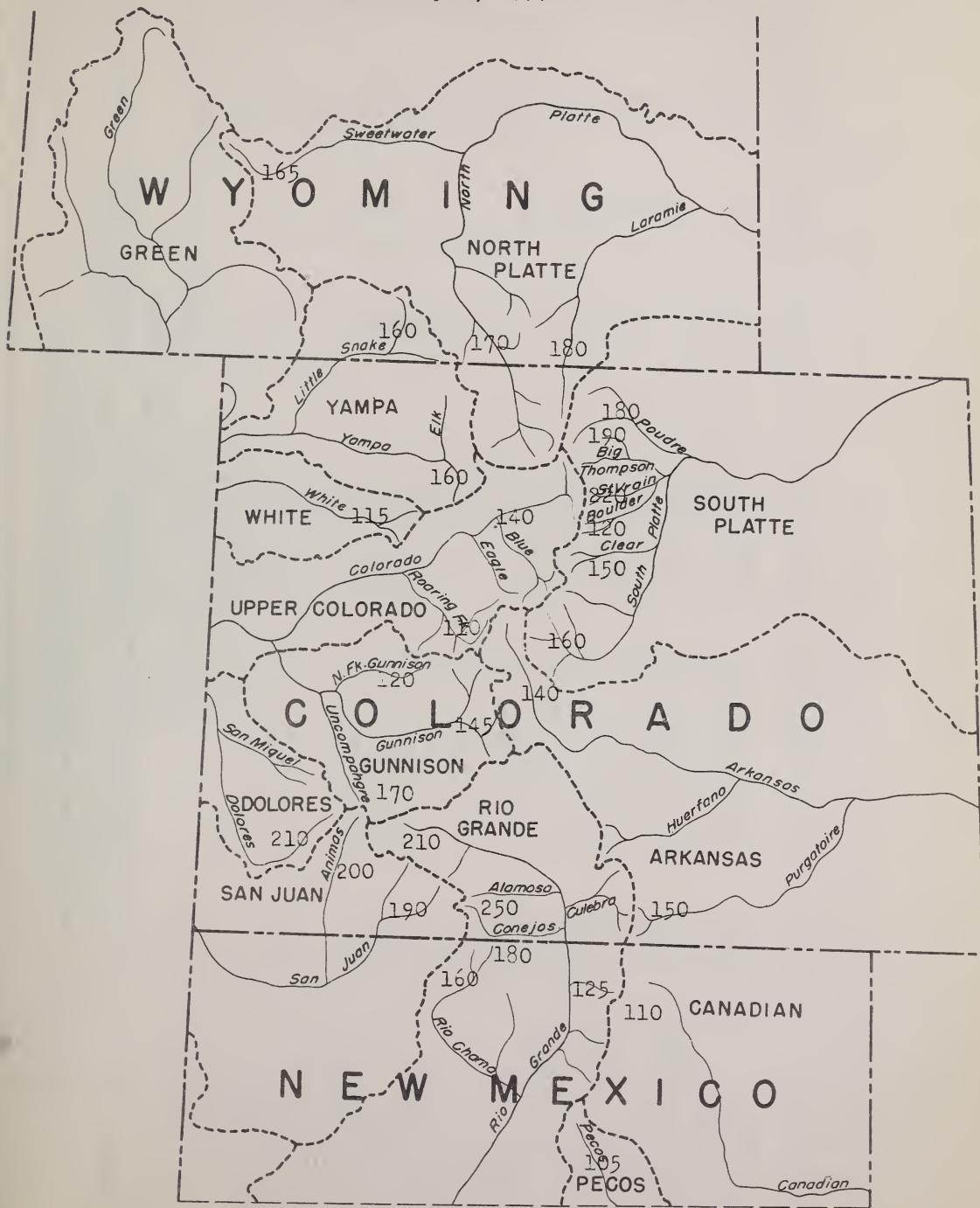
ARKANSAS RIVER

On the headwaters of the Arkansas River snow cover is less than in other areas in Colorado. However, February 1 snow surveys show an average of 37 percent above normal and 20 percent over last year. Precipitation in the valley has been generally below average during recent months. Soil moisture is dry except at higher elevations. Reservoir storage is about one-half of a year ago, except for John Martin and Great Plains. Current storage in these reservoirs is 126,000 and 100,000, respectively.

1960-1961

WATER CONTENT OF SNOW ON THE WATERSHEDS OF
PLATTE, ARKANSAS, UPPER COLORADO AND RIO GRANDE BASINS
BASED ON SNOW SURVEYS MADE APPROXIMATELY FIRST DAY OF MONTH

In Percent of Normal
February 1, 1949



SUMMARY OF FEBRUARY 1 SNOW SURVEYS AND COMPARISON OF DATA

WITH THAT OF PREVIOUS YEARS BY WATERSHEDS

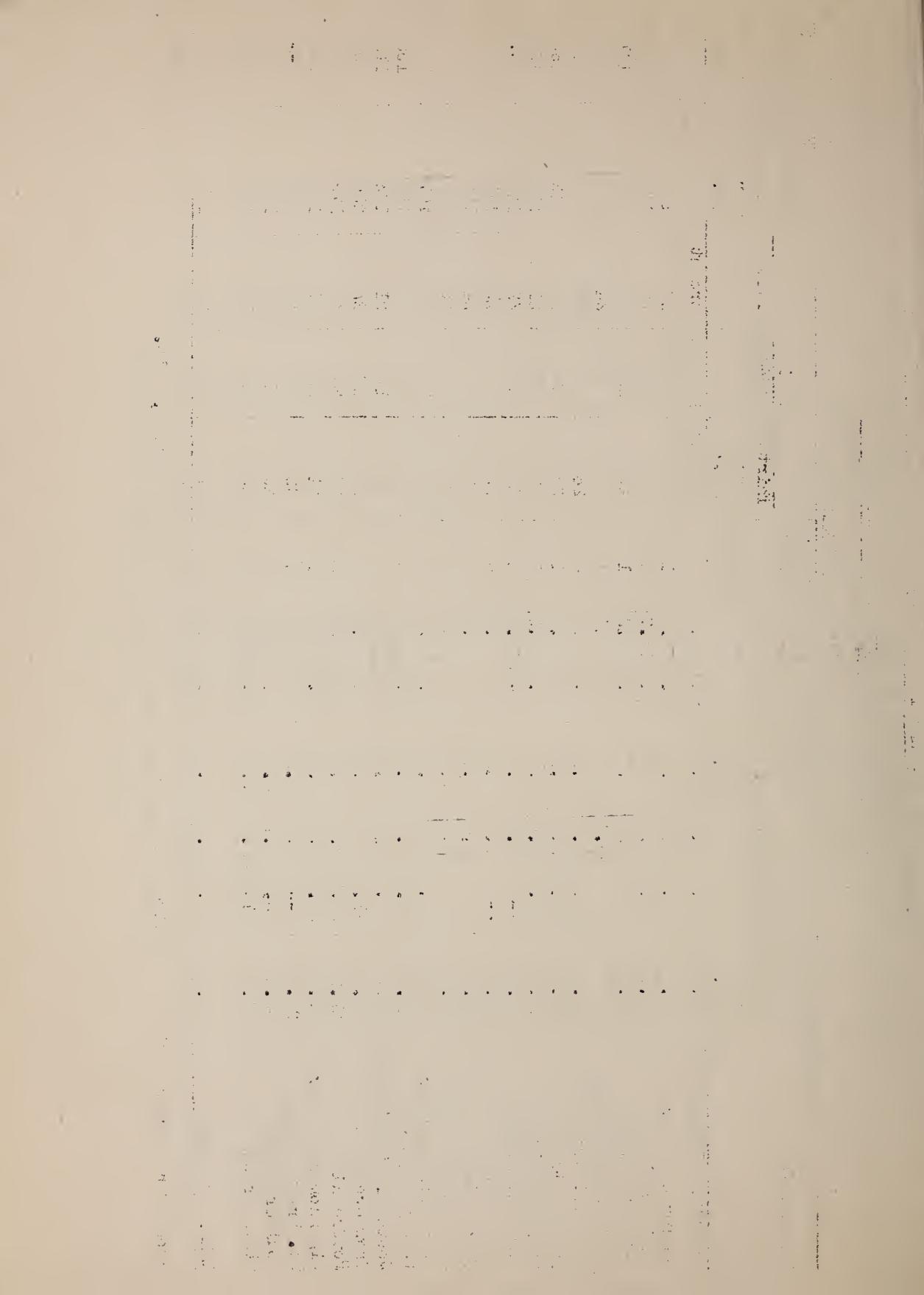
MISSOURI-ARKANSAS DRAINAGE BASINS

WATERSHEDS	Snow Depth						Water Content						Number Courses in Average						Snow Density						1949 Water Content in percent of					
	Thirteen Year			1948			1949			Thirteen year			1948			1949			Thirteen year			Avg.*			1948					
	In.	In.	Avg.*	In.	In.	Avg.*	In.	In.	Avg.*	In.	In.	Avg.*	In.	In.	Avg.*	In.	In.	Avg.*	In.	In.	Avg.*	In.	In.	Avg.*	In.	In.	Avg.*			
MISSOURI RIVLR	15.4	20.3	25.0	2.7	3.7	3.9	1	1	1	18	18	16	144	144	105															
Jefferson River	34.1	31.3	42.6	8.1	7.8	11.7	3	24	25	25	25	25	28	145	150															
Madison River	38.6	34.4	48.3	9.7	8.8	14.2	1	25	25	25	25	25	29	146	161															
Gallatin River																														
Yellowstone River																														
Missouri River**	23.4	37.5	35.4	5.6	9.5	7.5	4	24	25	25	25	25	21	134	79															
Marias River	35.5	30.4	45.3	11.2	8.2	12.6	1	32	27	27	27	27	28	112	154															
Cheyenne River	18.2	23.0	31.0	3.1	4.3	6.5	3	17	19	19	19	19	21	210	151															
Shoshone River	42.2	--	46.8	11.7	--	14.8	2	28	32	126	--															
Wind River	28.6	--	32.7	6.5	--	8.2	6	23	23	23	23	23	25	126	--															
Popo Agie	26.4	38.4	38.4	5.8	5.8	9.4	3	22	22	22	22	22	24	162	--															
Sweetwater	33.0	46.6	7.5	--	--	--	--	23	23	23	23	23	25	155	--															
North Platte River	44.0	43.4	59.9	11.2	12.2	18.6	8	25	25	25	25	25	28	31	167															
Laramie River	24.8	30.5	38.0	6.0	7.3	10.9	5	24	24	24	24	24	29	182	150															
South Platte River***	20.1	28.0	27.4	3.5	4.8	5.7	3	17	17	17	17	17	21	163	119															
Crow Creek	13.8	21.6	25.9	2.7	4.6	6.9	1	20	21	21	21	21	27	256	150															
Poudre River	21.2	31.3	32.8	5.6	7.6	10.0	3	26	24	24	24	24	30	179	132															
Big Thompson River	27.3	33.5	40.6	5.8	7.3	11.0	1	21	22	22	22	22	27	190	151															
St. Vrain River	28.0	--	43.2	6.3	14.4	14.4	1	22	33	33	33	33	229	--																
Boulder Creek	35.8	45.0	45.7	10.3	14.0	11.2	1	29	31	31	31	31	25	109	80															
Clear Creek	34.6	41.5	40.9	7.9	8.8	11.8	2	23	21	21	21	21	29	149	134															
ARKANSAS RIVER	27.2	32.1	32.8	5.7	6.5	7.8	9	21	20	20	20	20	24	137	120															

*Some for shorter periods

**Between Helena and Great Falls

***Above Denver, Colo.



SNOW SURVEYS AND IRRIGATION WATER FORECASTS
FOR MISSOURI AND ARKANSAS RIVERS
February 1, 1949

P R E C I P I T A T I O N D A T A

WATERSHED	STATE	Precipitation		Departure from Normal		Precipitation January Inches	Departure from Normal Inches
		October 1 to January 31	Inches	Inches	Inches		
Missouri	East. Mont.						
Missouri	Cent. Mont.						
Missouri	North Wyo.	3.83		+0.56		1.07	+0.29
Wyoming	Wyoming	5.19		+1.50		1.47	+0.52
Colorado	Colorado	2.88		-0.04		0.88	+0.50
Arkansas	Colorado	3.64		-0.37		1.32	+0.44

Accumulated precipitation since October 1 on the watershed of the Missouri River in Colorado and Wyoming was above normal except for the South Platte. Precipitation on the Arkansas River was also below normal. January precipitation was above normal in all areas.

MISSOURI-ARKANSAS RIVERS SNOW SURVEYS

February 1, 1949

卷之三

ST-1114 *
ASTORIA,
FEBRUARY 1943

MISSOURI ARKANSAS RIVERS SNOW SURVEYS

February 1, 1949

Drainage Basin and Snow Course	No. and State	Location				Date of Survey (Inches)	Snow Cover Measurements			Past Record (Inches)
		Sec.	Twp.	Range	Elev.		Water Content (Inches)	Yrs. of Rec.		
SHOSHONE RIVER										
Sylvan Pass	32 Wyo.	12	52N	110W	7100	1/30	39.4	9.4	5	10.3
Brooks Lake #3*	50 " "	23	44N	110W	9200	1/26	54.1	18.7	8	13.1
East Entrance	65 "	17	52N	109W	7000	1/31	36.7	10.7	-	—
			Average for drainage				46.8	14.0		11.7
UPPER WIND RIVER										
Sheridan Creek R.S.	49 "	3	42N	109W	7500	1/26	27.2	6.3	7	4.6
Brooks Lake #3	50 "	23	44N	110W	9200	1/26	54.1	18.7	8	13.1
St. Lawrence R.S.	51 "	26	1N	4W	9000	2/4	29.3	5.7	5	5.2
Mosquito Park RS	52 "	23	2S	3W	9500	2/3	30.8	6.8	5	5.6
DuNoir	53 "	27	42N	108W	8750	1/27	29.0	6.2	7	6.0
T-Cross Ranch	54 "	1	43N	107W	8000	1/30	26.0	5.5	7	4.6
Hobbs Park	55 "	22	2S	3W	10000	2/3	45.6	12.8		
Trout Creek	56 "				8400	2/3	25.3	5.8		
Dinwoodie	60 "	9	38N	105W	10000	1/28	36.8	9.1		
Dry Creek	61 "	34	4N	105W	9500	1/28	25.9	5.1		
Burroughs Creek	62 "	15	43N	107W	8800	2/2	39.1	9.8		
Little Farm	63 "	24	41N	108W	9500					
Geyser Creek	64 "	12	41N	108W	8500	1/27	28.8	6.3		
			Average for drainage				32.7	8.2		6.5
POPO AGIE RIVER										
Sawmill Glade	45 "	3	31N	101W	8500	2/1	27.0	5.9	7	3.9
Blue Ridge	46 "	23	31N	101W	9500	2/1	41.4	10.0	7	6.2
South Pass	47 "	13	30N	101W	9000	1/31	46.7	12.2	7	7.4
			Average for drainage				38.4	9.4		5.8
LITTLE BIG HORN										
Owl Creek	58 "	36	43N	101W	8700	1/24	18.4	4.2		
Beavers Mill	59 "	6	43N	102W	8900	1/25	24.5	5.5		
Timber Creek	66 "	25	47N	103W	9000	1/29	21.0	5.0		4.9
			Average for drainage				21.3			

MISSOURI-ARKANSAS RIVERS SNOW SURVEYS
February 1, 1949

Drainage Basin and Snow Course	No. and State	Location					Snow Cover Measurements				
		Sec.	Twp.	Ridge	Elec.	Date of survey	Missouri River	Water Content (Inches)	1947	1948	Yrs. of record
										Rec.	Content (Inches)
CHEYENNE RIVER											
Upper Spearfish	1 S. Dak.	21	3N	1E	6500	2/1	38.8	8.7	5.7	2.7	3.9
Upper Castle	2 "	24	2N	1E	6800	2/1	31.5	6.4	4.7	3.1	3.5
Deerfield	3 "	23	1N	2E	6000	1/28	22.6	4.5	2.6	2.4	3.5
SWEETWATER RIVER											
Grennier Meadows	29 Wyo.	19	30N	100W	9000	1/31	46.5	11.1	—	10.5	7
South Pass*	47 "	13	30N	101W	9000	1/31	46.7	12.2	—	9.8	7
NO. PLATTE RIVER											
Cameron Pass	1 Colo.	2	6N	76W	10300	1/27	50.7	16.5	13.5	14.2	11.5
Park View	7 "	24	5N	78W	9200	1/27	37.4	8.6	—	6.8	5.1
Columbine Lodge	8 "	21	5N	82W	9300	2/1	61.0	19.6	15.8	10.9	12.9
Willow Cr. Pass*	62 "	1	4N	78W	9500	1/27	44.7	12.4	—	8.0	6.8
Spicer	112 "	27	6N	81W	8400,	2/3	40.8	12.7	—	—	—
Bottle Creek	7 Wyo.	24	14N	85W	8200	1/27	47.1	13.8	8.7	7.3	6.9
Webber Spring	8 "	27	14N	85W	9000	1/27	60.4	18.7	10.2	10.8	9.0
Old Battle	9 "	29	14N	85W	9800	1/26	91.3	28.1	17.7	21.2	17.0
N. French Creek	37 "	27	16N	80W	10200	1/31	71.0	24.1	15.5	15.4	15.4
N. Barrett Creek	38 "	30	16N	80W	9400	1/31	57.0	16.7	10.2	9.8	10.6
Ryan Park	39 "	34	16N	81W	8400	2/1	41.1	11.5	5.9	5.1	6.1
Spring Creek	67 "	32	15N	85W	9000	2/3	42.6	12.1	—	—	—
Albany	68 "	18	14N	78W	9400	2/3	—	—	—	—	—
La Bonte	69 "	11	27N	74W	8450	—	—	—	—	—	—
										Average for drainage	11.6
											12.2
											11.6

*On adjacent drainage

100
100
100
100

100
100
100
100

100
100
100
100

100
100
100
100

100
100
100
100

100
100
100
100

100
100
100
100

100
100
100
100

100
100
100
100

100
100
100
100

100
100
100
100

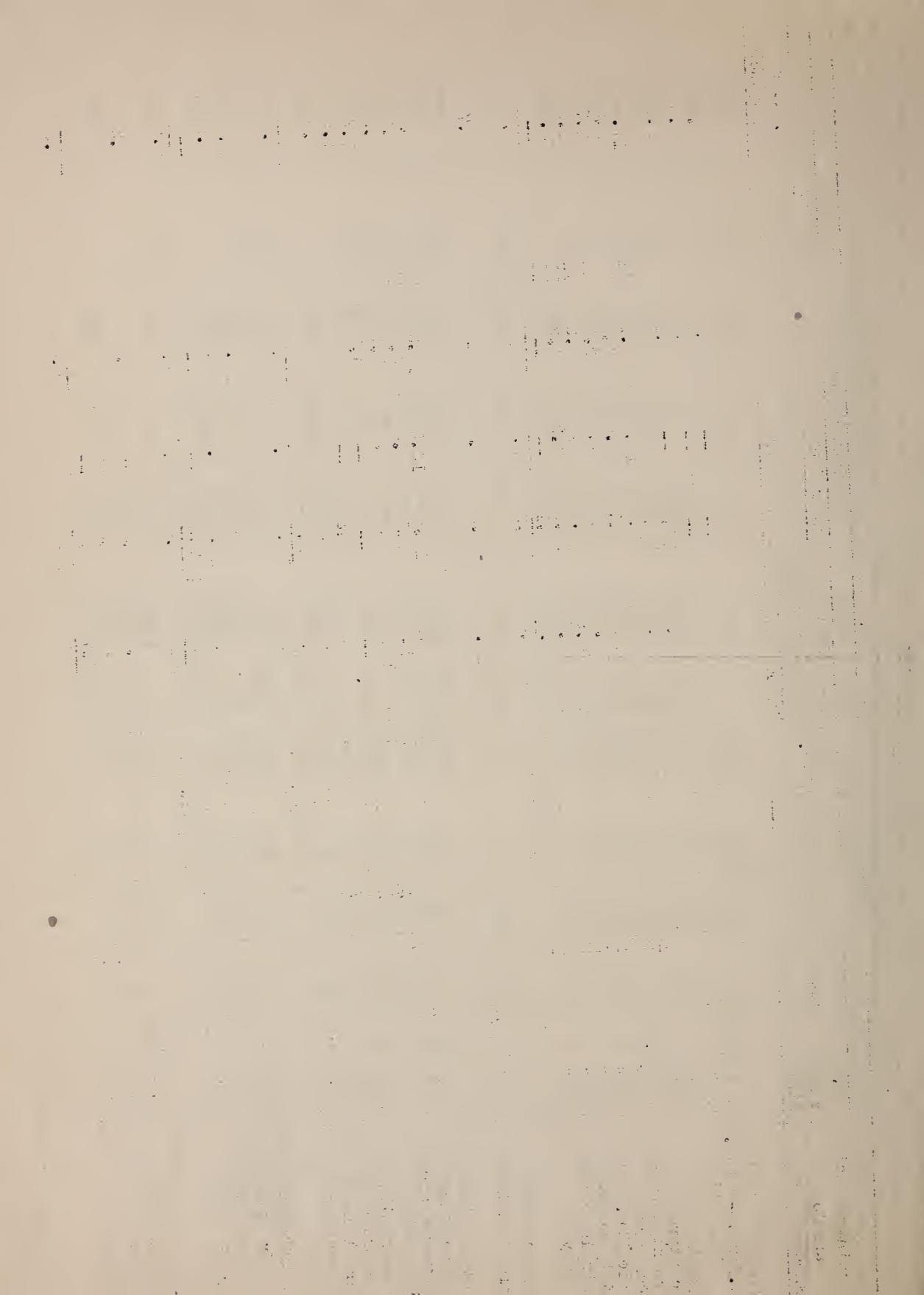
100
100
100
100

MISSOURI-ARKANSAS RIVERS SNOW SURVEYS

February 1, 1949

Drainage Basin and Snow Course	No. and State	Location				Date of Survey	Snow Depth (Inches)	Snow Cover Measurement (Inches)			Past Record
		Sec	Twp	Range	Elev.			Water Content (Inches)	Yrs. of Rec.		
MISSOURI RIVER											Av. Water Content (Inches)
LARAMIE RIVER											
W. Port. G-P Tun. Deadman Hill*	4 Colo.	7	8 N	75 W	8600	10/200	1/29	57.2	---	5.1	8
Roach	50 "	26	10 N	75 W	9800	1/28	38.8	15.4	---	9.7	4.9
McIntyre	88 "	5	10 N	77 W	9100	1/28	53.7	10.5	---	8	7.3
Brooklyn Lake	111 "	35	10 N	76 W	10200	2/1	35.4	17.8	11.9	11.8	9.4
Fox Park	11 " Wyo.	11	16 N	79 W	9200	2/1	25.9	8.7	6.6	3.9	5.0
Pole Mtn. "2*	34 "	21	13 N	78 W	8700	1/30	36.5	6.9	4.6	12	2.7
Libby Lodge	35 "	29	15 N	72 W	8700	2/1	38.3	9.9	6.3	11	4.9
Hairpin Turn	36 "	24	16 N	79 W	9500	2/1	42.6	11.0	6.2	11	5.8
Albany	68 "	18	14 N	78 W	9400	2/3	12.1	7.2	---	---	---
Average for drainage							38.0	10.9	7.3	6.0	6.0
CROW CREEK											
Pole Mtn. "2*	34 "	35	15 N	72 W	8700	1/30	25.9	6.9	4.6	2.6	2.7
POUDRE RIVER											
Cameron Pass	1 Colo.	2	6 N	76 W	10300	1/27	50.7	16.5	13.5	14.2	11.3
Chambers Lake	2 "	6	7 N	75 W	9000	1/25	31.3	9.1	6.4	4.0	4.2
Big Soutin	3 "	33	8 N	75 W	8600	1/27	16.4	4.5	2.9	1.2	1.3
Deadman Hill	50 "	26	10 N	75 W	10200	---	57.1	---	9.7	9	7.3
Lake Irene*	65 "	8	5 N	75 W	10600	1/30	19.3	---	13.6	10	11.9
Hour Glass Lake	68 "	18	7 N	73 W	9500	2/3	34.1	9.0	4.6	9	3.9
Red Feather	128 "	26	10 N	74 W	9000	2/3	32.8	10.0	7.6	6.5	5.6
Average for drainage											
BLT THOMPSON RIVER											
Lake Irene*	65 "	8	5 N	75 W	10600	1/30	57.1	19.5	11.0	7.3	11.9
Hidden Valley	95 "	23	5 N	75 W	9550	2/1	40.6	7.5	---	7.8	5.8
Deer Ridge	115 "	19	5 N	73 W	9050	2/1	26.7	11.0	7.5	7.8	---
ST. VRAIN RIVER											
Wild Basin	41 Colo.	24	3 N	74 W	10000	2/1	43.2	14.4	---	8.4	6.3
Copeland Lake	116 "	21	3 N	73 W	8600	1/31	20.9	6.5	---	---	---
Raymonds	129 "	5	2 N	72 W	8750	1/31	15.7	2.8	14.4	8.4	6.3
Average for drainage											

*On adjacent drainage



MISSOURI-ARKANSAS RIVERS SLICW SURVEYS

February 1949

*On adjacent drainage

The following organizations cooperate in the snow surveys and irrigation water supply forecasts for the Colorado, Missouri-Arkansas and Rio Grande watersheds by furnishing funds or services.

STATE

Colorado State Engineer
Wyoming State Engineer
Utah State Engineer
New Mexico State Engineer
Arizona State Engineer
Sequoia State Engineer
Colorado Experiment Station
Colorado Extension Service
Montana Experiment Station
Fish Experiment Station

FEDERAL

Department of Agriculture
Forest Service
Soil Conservation Service
Department of Interior
Bureau of Reclamation
Geological Survey
National Park Service
Department of Commerce
Weather Bureau
Air Department
Army Engineer Corps

PUBLIC UTILITIES

Colorado Public Service Company
Western Colorado Power Company
Unocal Power Company
Public Service Company of New Mexico
Denver and Rio Grande Western R. R. Company

MUNICIPALITIES

City of Colorado
City of Durango
City of Boulder

WATER USERS' ORGANIZATIONS

Poudre Valley Water Users' Association
Arkansas Valley Water Association
Colorado River Water Conservation District

IRRIGATION PROJECTS

Turman Reservoir and Irrigation Company
San Luis Valley Irrigation District
Santa Maria Reservoir Company
Cimarron Land Company
Uncompahgre Valley Water Users' Association
Riverton Development Company
Goshen Irrigation District
Arapahoe Project
Potholder Irrigation District
Salt River Valley Water Users' Association
San Duran Irrigation and Drainage District
Rio Lobo Reservoir and Canal Company

Many other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

